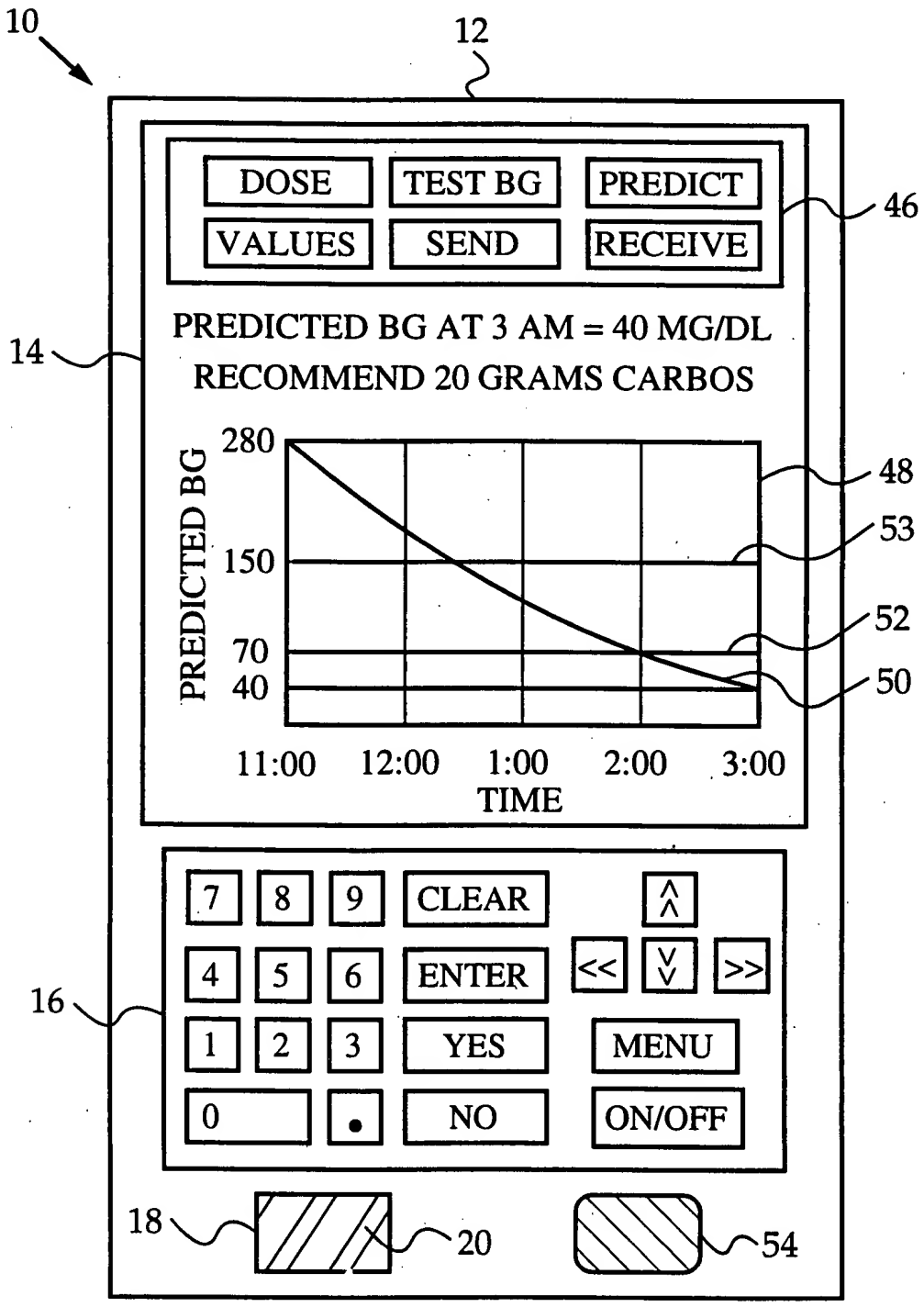
10
12
DOSE
TEST BG
PREDICT
VALUES
SEND
RECEIVE
46
PREDICTED BG AT 3 AM = 40 MG/DL
RECOMMEND 20 GRAMS CARBOS
14
PREDICTED BG
280
150
70
40
48
53
52
50
11:00
12:00
1:00
2:00
3:00
TIME
7
8
9
CLEAR
4
5
6
ENTER
1
2
3
YES
0
.
NO
<<
>>
MENU
ON/OFF
16
18
20
54

FIG. 1

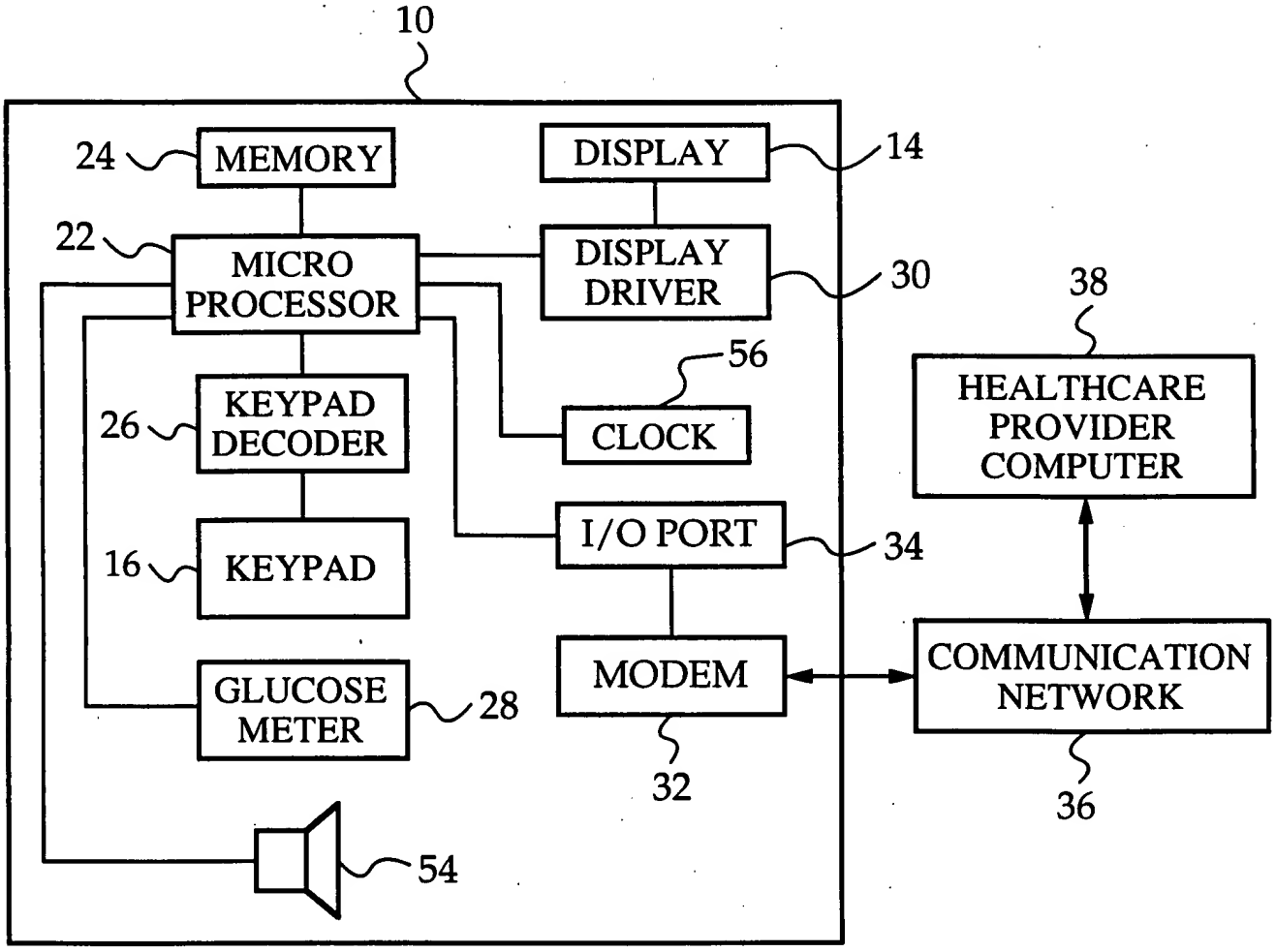
10
24
MEMORY
DISPLAY
14
22
MICRO PROCESSOR
DISPLAY DRIVER
30
38
56
HEALTHCARE PROVIDER COMPUTER
26
KEYPAD DECODER
CLOCK
I/O PORT
34
16
KEYPAD
MODEM
COMMUNICATION NETWORK
GLUCOSE METER
28
32
36
54

FIG. 2

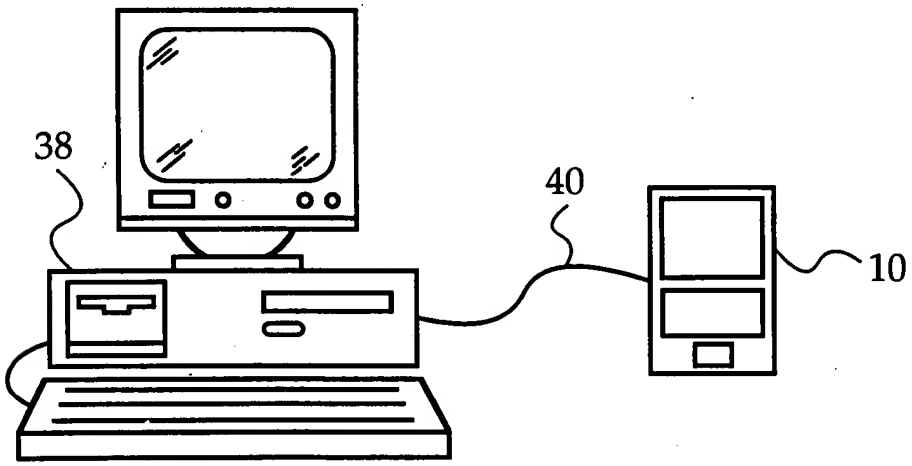
38
40
10

FIG. 3

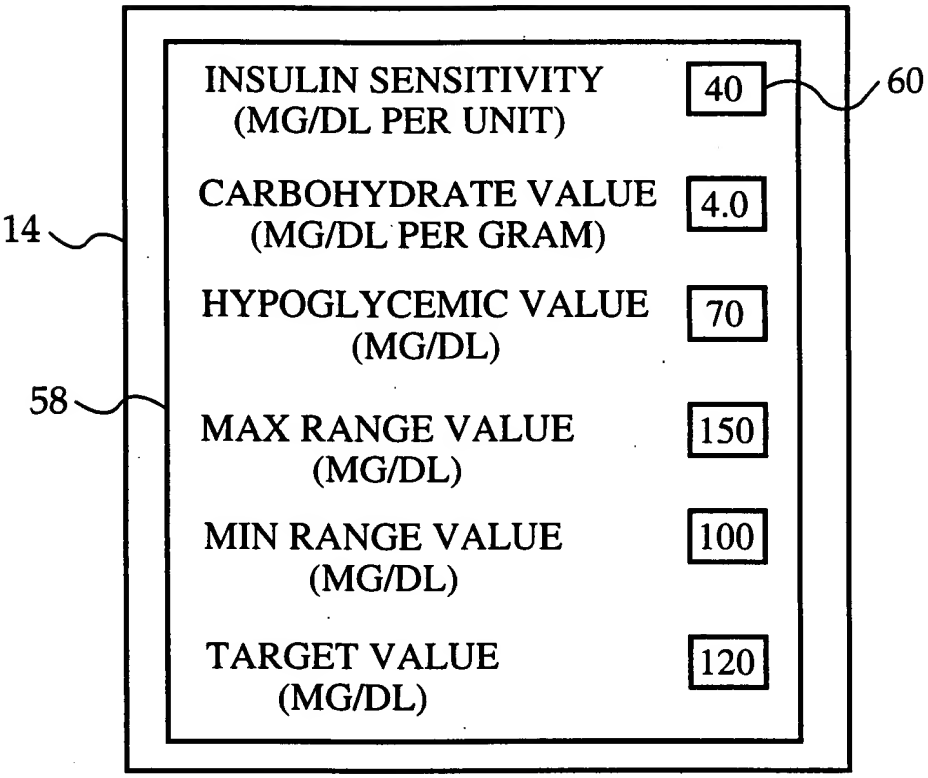
INSULIN SENSITIVITY (MG/DL PER UNIT)
40
60
CARBOHYDRATE VALUE (MG/DL PER GRAM)
4.0
14
HYPOGLYCEMIC VALUE (MG/DL)
70
58
MAX RANGE VALUE (MG/DL)
150
MIN RANGE VALUE (MG/DL)
100
TARGET VALUE (MG/DL)
120

FIG. 4

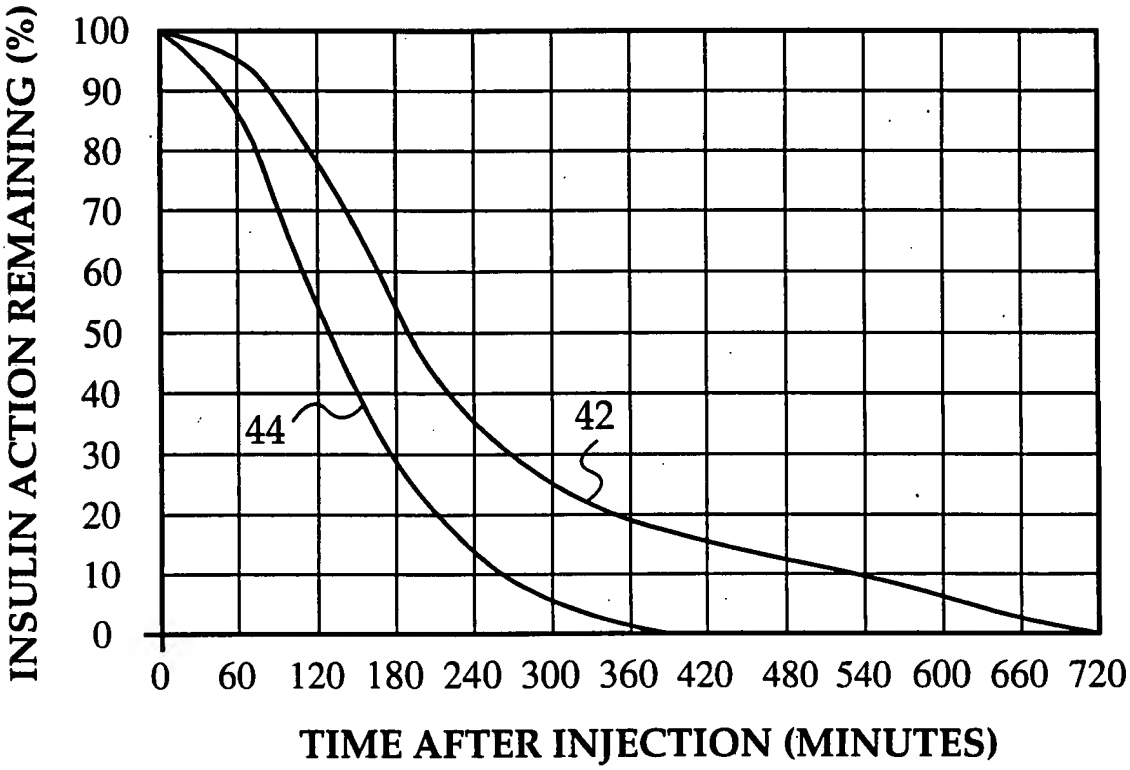
INSULIN ACTION REMAINING (%)
100
90
80
70
60
50
40
30
20
10
0
44
42
0
60
120
180
240
300
360
420
480
540
600
660
720
TIME AFTER INJECTION (MINUTES)

FIG. 5

TABLE 1

TIME AFTER INJECTION (MINUTES)	$F_k(t)$
0	1.00
15	0.98
30	0.97
45	0.96
60	0.94
75	0.90
90	0.86
105	0.82
120	0.78
135	0.70
150	0.64
165	0.58
180	0.52
195	0.48
210	0.44
225	0.40
240	0.36
255	0.30
270	0.28
285	0.26
300	0.24
315	0.22
330	0.20
345	0.19

FIG. 6A

TABLE 1 (CONT.)

TIME AFTER INJECTION (MINUTES)	$F_k(t)$
360	0.18
380	0.17
400	0.16
420	0.15
440	0.14
460	0.13
480	0.12
500	0.11
520	0.10
540	0.09
560	0.08
580	0.07
600	0.06
620	0.05
640	0.04
660	0.03
680	0.02
700	0.01
> 720	0.00

FIG. 6B

TABLE 2

TIME AFTER INJECTION (MINUTES)	$F_k(t)$
0	1.00
15	0.97
30	0.93
45	0.90
60	0.85
75	0.80
90	0.70
105	0.60
120	0.52
135	0.46
150	0.40
165	0.32
180	0.28
195	0.22
210	0.16
225	0.14
240	0.12
255	0.10
270	0.08
285	0.07
300	0.06
315	0.05
330	0.04
345	0.03
360	0.02
375	0.01
> 390	0.00

FIG. 7

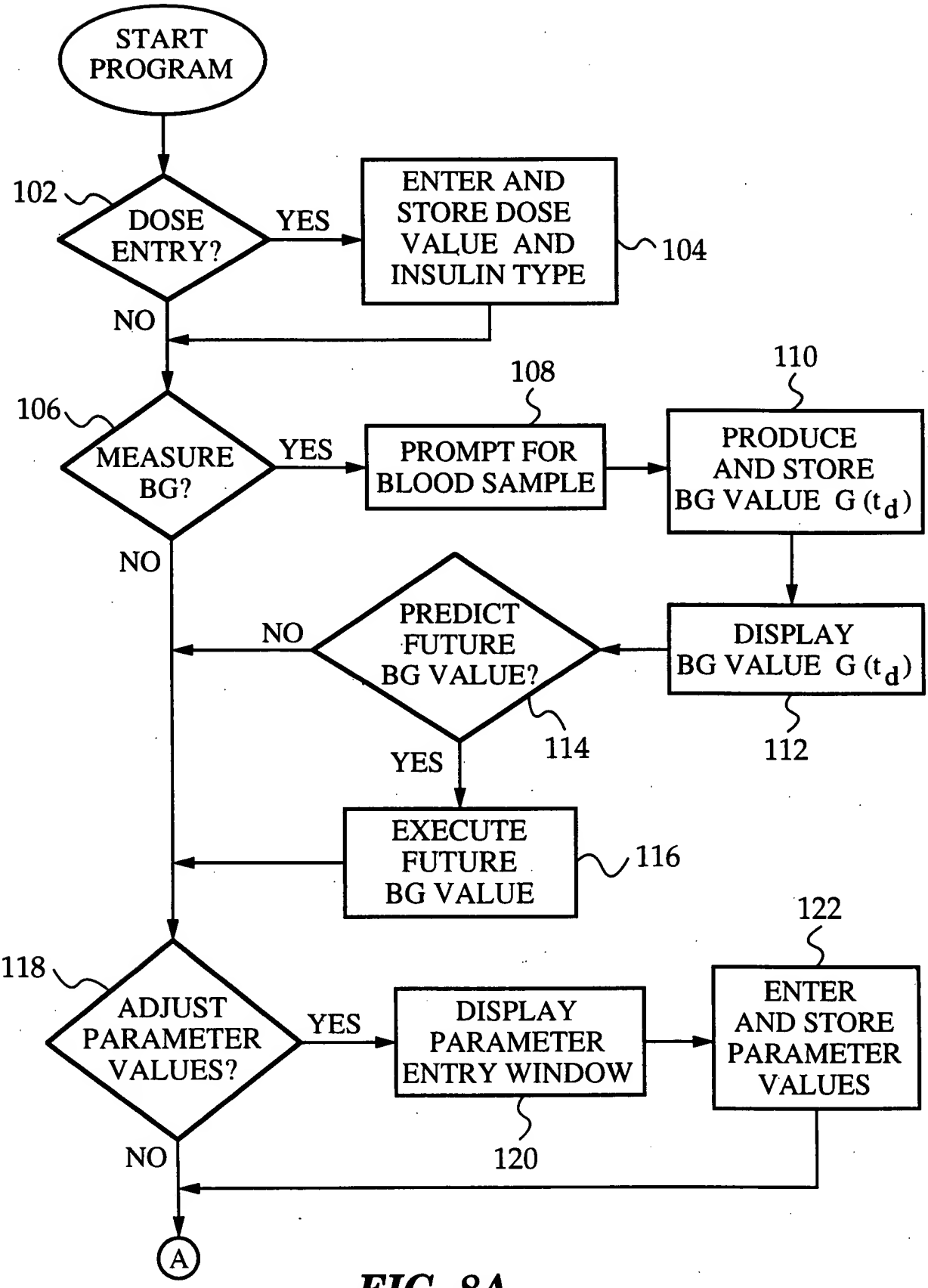
START PROGRAM
102
DOSE ENTRY?
YES
ENTER AND STORE DOSE VALUE AND INSULIN TYPE
104
NO
106
MEASURE BG?
YES
108
PROMPT FOR BLOOD SAMPLE
110
PRODUCE AND STORE BG VALUE G (t_d)
NO
PREDICT FUTURE BG VALUE?
NO
DISPLAY BG VALUE G (t_d)
114
112
YES
EXECUTE FUTURE BG VALUE
116
118
ADJUST PARAMETER VALUES?
YES
DISPLAY PARAMETER ENTRY WINDOW
120
122
ENTER AND STORE PARAMETER VALUES
NO
A

FIG. 8A

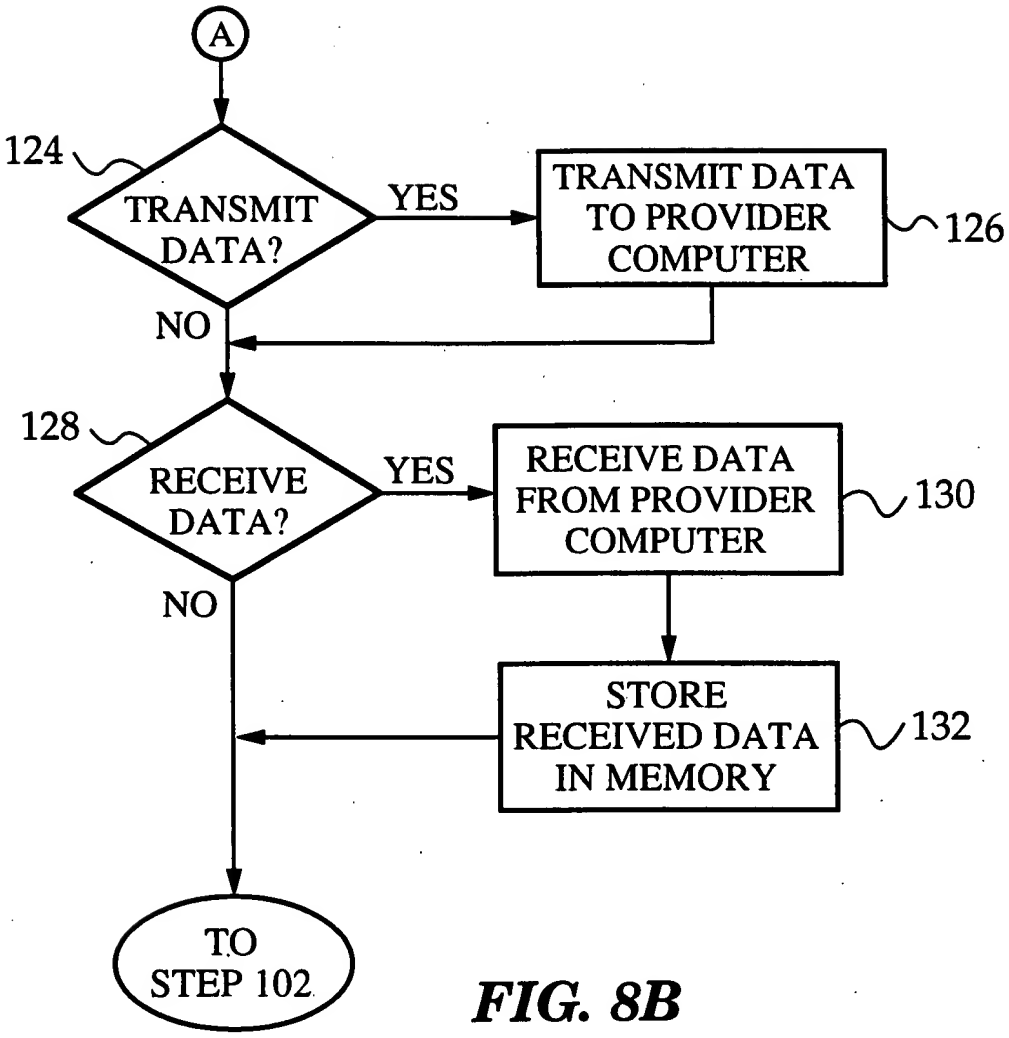
A
124
TRANSMIT DATA?
YES
TRANSMIT DATA TO PROVIDER COMPUTER
126
NO
128
RECEIVE DATA?
YES
RECEIVE DATA FROM PROVIDER COMPUTER
130
NO
STORE RECEIVED DATA IN MEMORY
132
TO STEP 102

FIG. 8B

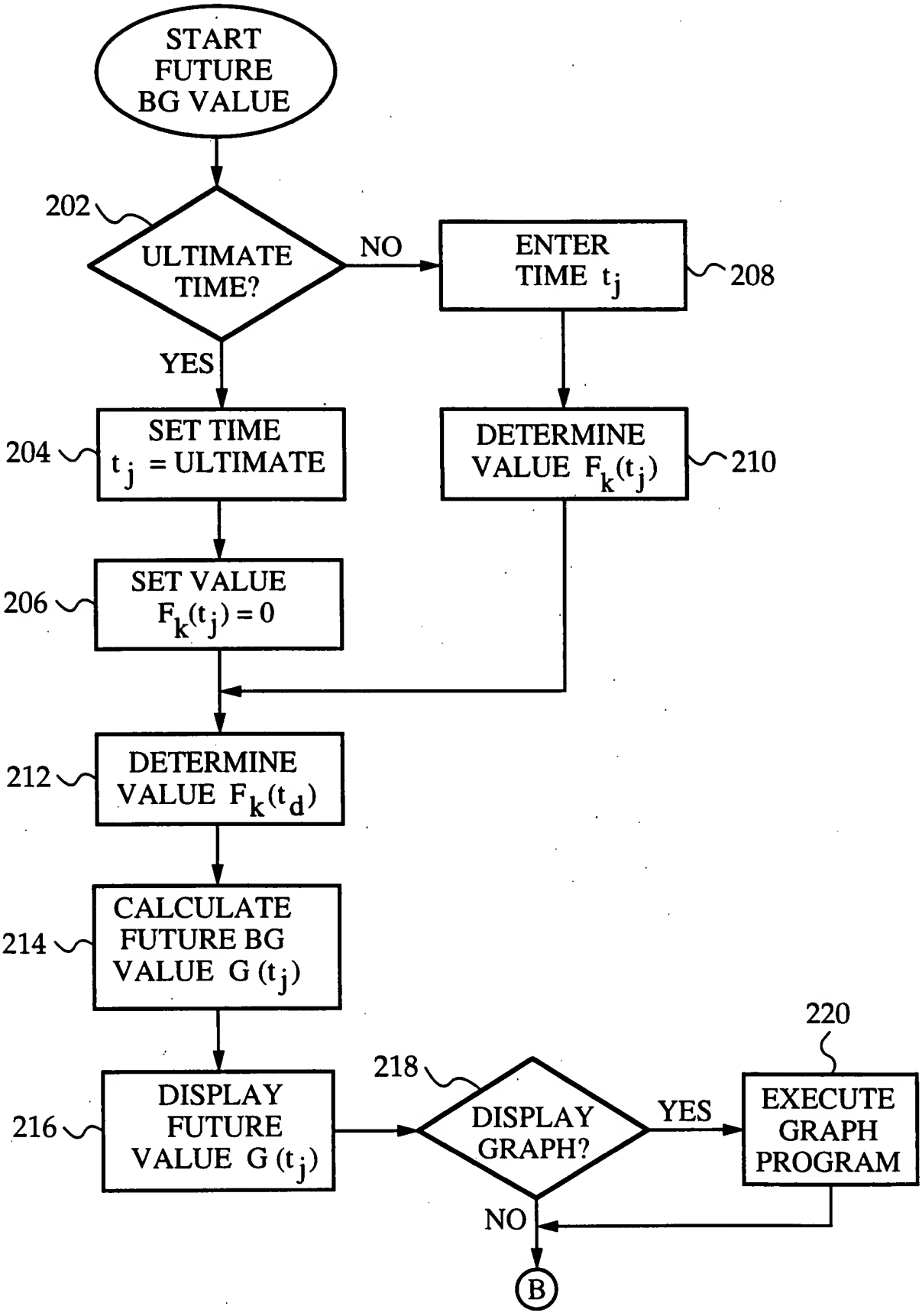
START FUTURE BG VALUE
202
ULTIMATE TIME?
NO
ENTER TIME t_j
208
YES
204
SET TIME t_j = ULTIMATE
DETERMINE VALUE $F_k(t_j)$
210
206
SET VALUE $F_k(t_j) = 0$
212
DETERMINE VALUE $F_k(t_d)$
214
CALCULATE FUTURE BG VALUE $G(t_j)$
216
DISPLAY FUTURE VALUE $G(t_j)$
218
DISPLAY GRAPH?
YES
220
EXECUTE GRAPH PROGRAM
NO
B

FIG. 9A

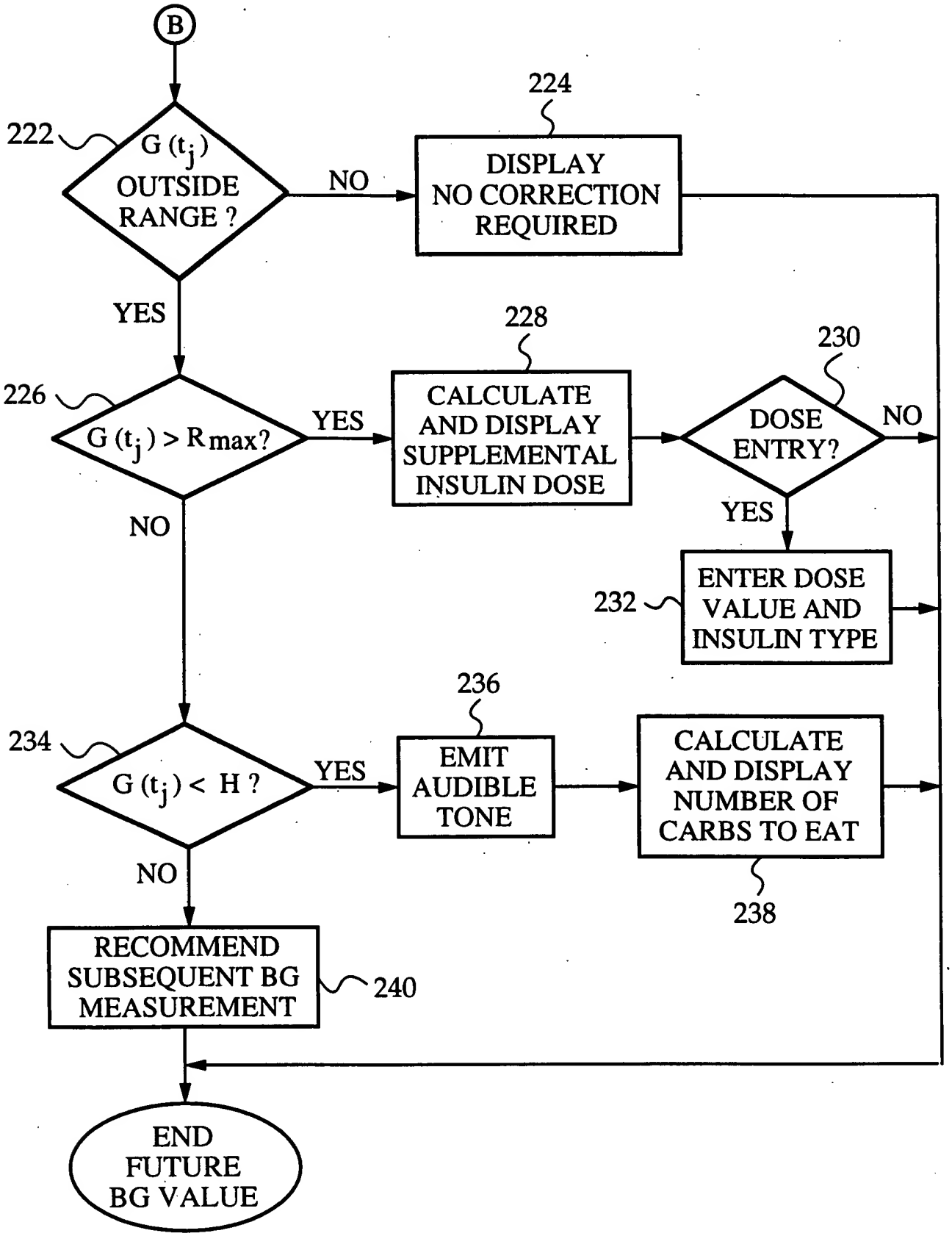
B
222
G (t_j) OUTSIDE RANGE ?
NO
224
DISPLAY NO CORRECTION REQUIRED
YES
226
G (t_j) > R max?
YES
228
CALCULATE AND DISPLAY SUPPLEMENTAL INSULIN DOSE
230
DOSE ENTRY?
NO
YES
232
ENTER DOSE VALUE AND INSULIN TYPE
NO
234
G (t_j) < H ?
YES
236
EMIT AUDIBLE TONE
CALCULATE AND DISPLAY NUMBER OF CARBS TO EAT
238
NO
RECOMMEND SUBSEQUENT BG MEASUREMENT
240
END FUTURE BG VALUE

FIG. 9B

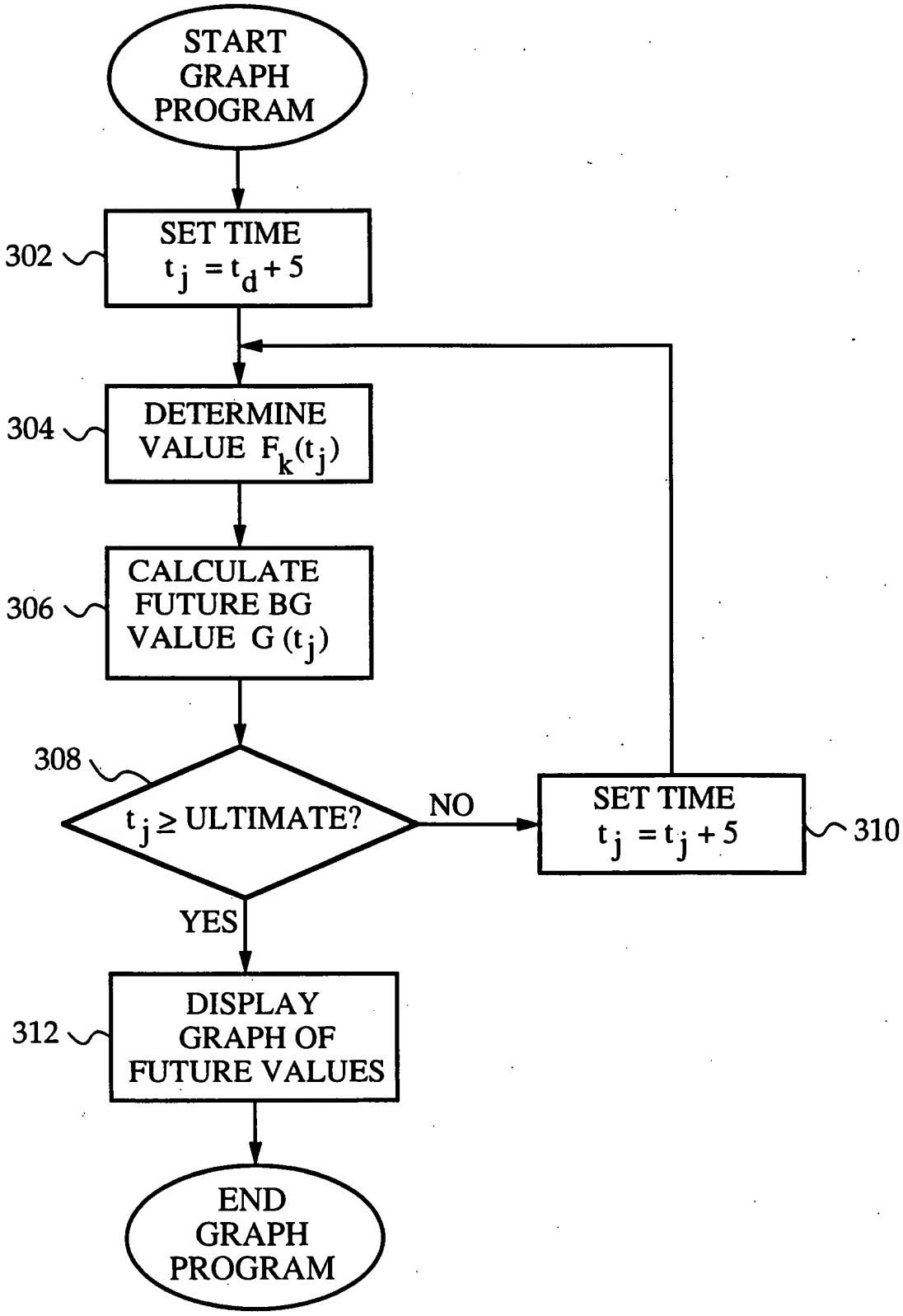
START GRAPH PROGRAM
302
SET TIME $t_j = t_d + 5$
304
DETERMINE VALUE $F_k(t_j)$
306
CALCULATE FUTURE BG VALUE $G(t_j)$
308
$t_j \geq$ ULTIMATE?
NO
SET TIME $t_j = t_j + 5$
310
YES
312
DISPLAY GRAPH OF FUTURE VALUES
END GRAPH PROGRAM

FIG. 10